

NOTES.

SPEAKING at St. George's Hospital Medical School on Friday last, Lord Kelvin remarked :—The modern medical man must be a scientific man, and, what is more, he must be a philosopher. The fundamental studies of medicine are of a strictly materialistic kind, but they belong to a different world from the world which constitutes their main subject—the world of life. Let it not be imagined that any hocus-pocus of electricity or viscous fluids will make a living cell. Splendid and interesting work has recently been done in what was formerly called organic chemistry, a great French chemist taking the lead. This is not the occasion for a lecture on the borderland between what is called organic and what is called inorganic; but it is interesting to know that materials belonging to the general class of foodstuffs, such as sugar, and what might be also called a foodstuff, alcohol, can be made out of the chemical elements. But let not youthful minds be dazzled by the imaginings of the daily newspapers that because Berthelot and others have thus made foodstuffs they can make living things, or that there is any prospect of a process being found in any laboratory for making a living thing, whether the minutest germ of bacteriology or anything smaller or greater. There is an absolute distinction between crystals and cells. Anything that crystallises may be made by the chemist. Nothing approaching to the cell of a living creature has ever yet been made. The general result of an enormous amount of exceedingly intricate and thorough-going investigation by Huxley and Hooker and others of the present age, and by some of their predecessors in both the nineteenth and eighteenth centuries, is that no artificial process whatever can make living matter out of dead. This is vastly beyond the subject of the chemical laboratory, vastly beyond my own subject of physics or of electricity—beyond it in depth of scientific significance and in human interest.

MR. H. H. JEFFCOTT has been appointed assistant in the metrological department of the National Physical Laboratory.

By permission of His Majesty the King, the Sanitary Institute will henceforth be known as the Royal Sanitary Institute.

AN International Gas Exhibition will be held at Earl's Court from November 19 to December 17 inclusive, under the auspices of the Institution of Gas Engineers.

AN exhibition of water colours, photographs, and other articles of interest belonging to the National Antarctic Expedition will be opened at the Bruton Galleries, Bond Street, on Friday by Sir Clements Markham.

A SKETCH of some of the results of the public works policy in India during the last fifty years was given at the Institution of Civil Engineers on Tuesday, in the address of the president, Sir Guilford L. Molesworth, K.C.I.E. In the course of the address, it was pointed out that there are available in India millions of potential horse-power, in the form of water flowing from the mountain ranges, capable of being converted into electrical energy at generating stations in the hills, and conveyed, with slight loss in efficiency, to centres even at a distance, where it can be utilised for industrial purposes. A generating station has been erected at the Cauveri Falls, with a head of 380 feet. The turbines drive six generators, each of 1000 electrical horse-power, and the current is transmitted, at a pressure of 30,000 volts, for a distance of ninety-one miles, to the Kolar goldfields, with an efficiency of nearly 80 per cent. At the cordite

factory, Wellington, in the Nilgiri Hills, an effective fall of 660 feet is employed to work a turbine and alternators, generating about 1000 horse-power at a pressure of 5000 volts. As to irrigation, the amount of land irrigated in British India is about 44 million acres. Of these 17 million are irrigated by canals, 8 million from tanks, and 19 million from wells and other sources. In conclusion, the president remarked that although much has been done, far more yet remains to be done—in opening up the country, in the prevention of famines, in the regulation of the water supply, in the installation of works and factories, in the transmission of power generated by the hill falls to those centres where it can be profitably utilised, and in the general development of the resources of the Empire.

THE three articles in the October number of the *Zoologist* deal exclusively with local bird-faunas, namely, those of Oxfordshire, Donegal, and Jersey. The capture of a white-beaked dolphin (*Lagenorhynchus albirostris*) off Aberdeen is recorded.

THE director (Captain S. S. Flower) of the Giza Zoological Gardens, Cairo, has sent us a copy of a list of rare animals recently received from the Sudan, among which reference may be made to a female of the Niam-niam race of the chimpanzee (*Anthropopithecus troglodytes schweinfurthi*).

"GAMMARUS," otherwise the freshwater-shrimp (a name which, by the way, appears to be omitted from the text), forms the subject of the twelfth number of the *L.M.B.C. Memoirs*. Miss M. Cussans, the author, seems to have treated her subject in the same thorough manner which has been the rule in the earlier issues of this excellent series, and the four plates, although diagrammatic, are all that can be desired from the point of view of the student.

THE greater bulk of parts i. and ii. of vol. xxv. of *Notes* from the Leyden Museum is taken up by an article on the beetles of the family Paussidæ by Mr. E. Wasmann. These beetles, which are now definitely known to live in companionship with ants, are regarded by the author as the most interesting of all living creatures, since they show better than any other group the interdependence of morphology and biology. They are remarkable for the enormous size of their antennæ, and are believed to be the descendants of pre-Tertiary Carabidæ.

THE first of three lectures on the fossil vertebrates of Egypt was delivered at University College, Gower Street, by Dr. C. W. Andrews, of the British Museum, at 4.30 on October 31. This lecture was devoted to the Proboscidea. On November 7, at the same hour, the lecturer will discourse on Arsinoitherium and the Hyracoidæ, while on November 14 he will take into consideration the sirenians and reptiles. Free cards of admission to these lectures may be obtained on application to the registrar at University College.

ACCORDING to the report of the Government biologist for 1903, the Government of the Cape of Good Hope is making every effort to develop the local fisheries. During the year four large steam-trawlers arrived from Europe; two of these were unfortunately wrecked, but the others have been doing good work, as have also certain vessels belonging to private owners. A new fishing-ground, much nearer to Cape Town than any of the old ones, has been discovered, and has been the chief attraction for the new trawlers. The report contains reprints (without the plates) of various memoirs by specialists on different sections of the South African marine fauna.

"THE Animals of Africa" forms the title of an article by Mr. Lydekker in the October issue of the *Quarterly Review*. While admitting the African origin of the mastodons, the author does not consider that there are sufficient grounds for rejecting Huxley's theory that the bulk of the modern mammalian fauna of Africa came from the north. In an article on fatigue, Sir W. R. Gowers points out that the study it has received has been chiefly at the hands of Italians. The facts known relating to both muscular and brain fatigue are passed in review, and the methods of prevention are considered in turn. Mr. D. G. Hogarth describes the palace of Knossos, and his account of recent researches is accompanied by a large plan. Two other articles also are of special interest to men of science—one dealing with the Panama Canal and maritime commerce, the other summarising what has been accomplished in Wales in the provision of higher education. Referring to Sir Norman Lockyer's calculation, that to place the Welsh universities on a footing of equal efficiency with the best universities of Germany and America a capital sum of four millions is required, the writer says it is clear that Wales herself cannot raise a tithe of this large sum, and emphasises the fact that it is to the State that Wales must look for the bulk of the money needed.

In a brief *Bulletin* issued by the Michigan State Agricultural Experiment Station (No. 218) Mr. Fred Edwards reviews in popular language our present knowledge of soil bacteria in their relation to agriculture.

THE October number of *Climate* contains articles on malaria by Dr. Harford, the climate of Uganda and of Lovaleland by Mr. Cook and Mr. Fisher respectively, and medical articles, notes, and reviews.

THE *Journal* of the Royal Statistical Society for September (vol. lxxvii., part iii.) contains the second and third reports of the committee appointed to inquire into the production and consumption of meat and dairy products in the United Kingdom, with remarks thereon by Mr. Rew, from which it appears that we are well ahead of other European nations in meat consumption (122 lb. per head as against Germany's 99 lb.), but appreciably behind our American cousins (150 lb. per head), and much less carnivorous than our Australian kinsmen (262 lb. per head). Mr. Thompson contributes a paper on local expenditure and indebtedness in England and Wales, and Mr. Adam a newly calculated life-table for Scotland.

PROF. A. E. WRIGHT's system of anti-typhoid inoculation, introduced by him in 1896, after being applied to the British Army in India was forbidden by an army order in consequence of certain objections raised against it. During the South African War the inoculation of troops proceeding there was officially sanctioned, and Prof. Wright and his assistants injected some 100,000 men without the slightest mishap. At the termination of the war the advisory board of the reorganised Army Medical Department recommended that the practice of anti-typhoid inoculation should be suspended. Prof. Wright demurred to this decision, and in consequence Mr. Brodrick referred the matter to the Royal Society, and at their suggestion a special committee of the Royal College of Physicians was appointed to examine and report. This committee was composed of Dr. Rose Bradford, Dr. Gee, Dr. Howard Tooth, Prof. Simpson, and Dr. Caiger, and reported unanimously that, "after careful scrutiny of the statistics from both official and private sources which have been made available, we are of opinion that not only is a lessened susceptibility to the disease

brought about as a result of the inoculations, but the case mortality is largely reduced. We are further of opinion that with due care the process of inoculation is devoid of direct danger, but that under special circumstances there may possibly be some temporary increase of susceptibility to infection immediately following inoculation; and it is therefore desirable that the preparation of the vaccine and the inoculations should be carried out under specially skilled supervision." In spite of this favourable verdict the advisory board still maintained its opposition, and Mr. Arnold-Forster therefore appointed another committee to advise him, consisting of Colonel Bruce and Dr. James Galloway, of the advisory board, together with Dr. C. J. Martin and Dr. A. Macfadyen, Lister Institute, Dr. Bulloch, London Hospital, Dr. Bruce Low, Local Government Board, Major Leishman, R.A.M.C., and Prof. Wright. This committee has reported unanimously "that the anti-typhoid inoculation has resulted in a substantial diminution in the incidence and case mortality from typhoid fever, and recommend that the system introduced by Prof. Wright should be resumed in the Army." The Army Council has adopted this recommendation, and is proceeding to carry out inoculations and to conduct investigations, by the agency of Major Leishman, on volunteers from the 2nd Battalion of Royal Fusiliers now proceeding to India.

A LIST of fresh-water algæ, collected by Mr. A. Howard in Barbados, Dominica and Trinidad, and described by Mr. G. S. West, appears in the *Journal of Botany* (October). This contains species, some new, which are additional to those recorded in papers previously published by the same author. A species of *Glœotœnium*, a green alga, is figured, which is distinguished by the presence of a peculiar opaque cruciform zone. Biographical notes culled from Sir M. Grant Duff's "Notes from a Diary" and other sources include references to Sir James Paget, Brodrick, and John Ball.

THE success obtained with Para rubber in Ceylon has led to the experimental plantation of the tree in other countries. In India planters are wisely hesitating before they embark upon a venture which yields no return for five years or longer. It is obviously the duty of the superintendents of experimental gardens to investigate the possibilities, and in the Tennasserim circle, Burma, the scheme instituted by Mr. Manson for developing a large Para rubber plantation at Mergui is progressing. Up to the present serious depredations have been caused by deer and pigs which attack the seedlings, but by planting out two-year-old plants it is hoped that this may be to a great extent obviated. The experiment, which was started in 1901, will be followed with considerable interest by planters.

THE annual report of the Royal Alfred Observatory, Mauritius, for the year 1903, states that the rainfall of the island for the year (mean of fifty-one stations) was 68.8 inches, the average being 77.3 inches. The greatest falls in twenty-four hours were 9 inches at Constance d'Arifat on April 23, and 8.5 inches at Britannia on January 14. The number of ships which visited the island was 274, against 686 in 1882. From the observations contained in their logs, daily synoptic weather charts were prepared and tracks of cyclones laid down. Photographs of the sun were taken daily when the weather permitted; 173 negatives were sent to the Solar Physics Committee. During the year 117 earthquakes were recorded, particulars of which will be published in the annual volume of observations. Mr. Claxton states that much damage has been done to the library by white ants, and that it has been necessary to remove the books to another position.

THE U.S. Weather Bureau has issued its meteorological chart of the Great Lakes for the winter of 1903-4. This was the coldest winter in the lake region that has been experienced since the beginning of the Weather Bureau observations in 1871. Freezing temperatures commenced about the middle of November. The climax was reached in February, when the mean monthly temperature ranged about 10° below the normal in all districts. On Lake Superior the ice-fields did not disappear from the eastern portion until the last week in May, 1904. Several interesting photographs are given of vessels and ferries forcing their way through apparently impassable masses of ice as soon as a thaw set in. When navigation is practicable storm warnings are displayed by day and night, and at almost all stations a chart is issued showing the weather conditions at 8h. a.m. daily (except Sunday); masters of vessels are invited to obtain these charts, or any other information in connection with the weather, at any of the Weather Bureau offices.

APPENDIX iii. of a report upon the basin of the Upper Nile, with proposals for the improvement of that river by Sir William Garstin, contains an interesting account of the variations of level of Lake Victoria Nyanza contributed by Captain H. G. Lyons, the director of the Survey Department of Egypt. This lake has a water surface of about 68,000 square kilometres, and is situated about 1129 metres above sea-level. It is believed to be of shallow depth, and lies for the most part of the year in the region of the equatorial rain and cloud belt, the excess water draining off at the Ripon Falls by the Victoria Nile. After reference to the geology and climate of the region, a brief historical summary is given of the early lake levels as observed by travellers and others visiting or residing by it; this is followed by a detailed study and discussion of the various gauges. Some of the results obtained are as follows:—The annual oscillation of the lake is from 0.30 metre to 0.90 metre. Between 1896 and 1902 there was a fall of 76 cm. in the average level, since followed by a rise of 56 cm. The epochs of high and low levels are given as:—1878, high level; 1880-90, falling level; 1892-95, temporary high level; 1896-1902, falling level; 1903, rising level.

WE have received from Mr. W. J. Brooks, 33 Fitzroy Street, W., some of his patent flexible curves and a parabolic curve. One of the former is a strip of celluloid with tags at intervals along its length; when placed on paper it can be bent to any desired curve, the fingers being placed on the tags to keep the strip in position; the strip does not yield under the pen. A second form (pattern B) has a steel strip and is self-clamping and reversible; this ingenious device maintains the steel strip in any position by means of stiff-hinged linkwork attached to metal tabs. The shape of any curve thus formed by this strip can be transferred from one drawing to another, a desirable advantage to many workers. A third and longer form (pattern C), also self-clamping and reversible, has been designed for such special purposes as are required by ship and boat builders, but it will have a much wider field of adaptation, such as, for instance, in the construction of interpolation curves for wave-lengths in spectroscopic work, &c. This pattern, which can be obtained from one foot up to any length, consists of light wooden cross-bars hinged to tabs fixed to a steel strip. The strips slide through brass spring-clamps, and are thus held tight against a stout wooden bar running the length of the curve. Several patterns and sizes for all the curves are obtainable, and they may be

usefully employed for a great number of manipulations, such as curve drawing, transferring outlines of mouldings, &c. The parabola is of celluloid and is accurately cut, and its axis, focus and latus rectum neatly engraved on it. In addition to its use for draughtsmen, teachers of mathematics will find it serviceable for the study of that curve.

A NEW general theory of errors has been contributed to the *Proceedings* of the American Academy of Arts and Sciences, xi., 3 (August), by Mr. William Edward Story. The author's object has been to develop the theory in such a way as to avoid the usual assumptions, the legitimacy of which, as approximations, may be questioned. It is claimed that the present theory is based upon such simple principles as will be generally admitted to be necessary for the mathematical treatment of any theory. The fundamental assumptions are as follows:—Possible errors form a practically continuous sequence from a certain lower limit to a certain upper limit. The probability that the error of an observation lies between x and $x+dx$, where dx is infinitesimal, is $\phi(x)dx$, where $\phi(x)$ is an analytical function of x , developable by Taylor's theorem throughout the whole range of possible error. The probability that the error lies between given limits is independent of the unit of measurement.

ATTENTION has already been directed in these columns to the important innovation introduced into this country by the Drapers' Company in granting a sum of 1000l. to University College, London, for the furtherance of research in applied mathematics. No better testimony to the value of this grant could be adduced than is afforded by a reference to the pages of Nos. 1 and 2 of the technical series of the *Drapers' Company Research Memoirs*, edited by Prof. Karl Pearson. In the first of these Mr. E. S. Andrews discusses the stresses in crane and coupling hooks by means of the theory of elasticity, and describes experimental tests in verification of his theory. The present investigation shows not only that the existing theory is unsatisfactory, both theoretically and practically, but that improvements can well be made in existing types of hooks by following lines laid down in the paper. In the second paper Mr. L. W. Atcherley directs attention to certain very serious defects in the theory of masonry dams. It is shown that the stresses across vertical sections of a dam are far more important than those across horizontal sections, and that in many existing dams not only do shearing stresses exist in the vertical sections which are far in excess of any considered safe by engineers, but considerable tensile stresses also occur, which form a serious source of danger. These two papers are fitting illustrations of the many important practical problems now awaiting solution, which could be solved at a very small cost by the provision of further endowments for mathematical research.

THE third revised edition of "The Scope and Method of Political Economy," by Dr. J. N. Keynes, has been published by Messrs. Macmillan and Co., Ltd., at 7s. 6d. net.

MESSRS. ROUTLEDGE AND SONS, LTD., have added to their series of "Country Books" a profusely illustrated edition of Charles Kingsley's "Glaucus, or the Wonders of the Seashore." The volume is published at 3s. 6d.

SINCE the advent of the Nernst lamp, every physicist has recognised that it would ultimately be very serviceable for lantern purposes. Any lecturer interested in the matter may see a well designed lantern provided with Nernst filaments, in actual use, at Mr. R. W. Paul's, High Holborn.

MR. H. G. WELLS returns to the more serious side of his work in "A Modern Utopia," which is being published month by month in the *Fortnightly Review*. As in "Anticipations" and "Mankind in the Making," Mr. Wells concerns himself with sociological problems, and pictures the probable manners and customs of society in a Utopia, situated on a distant planet, which is the natural outcome of continued development on modern lines.

A REVISED edition of Mr. H. N. Chute's "Physical Laboratory Manual" has been published by Messrs. D. C. Heath and Co. In this edition sound and light have been made to follow mechanics, because, the author says, "there seems to be a consensus of opinion among teachers that . . . the grade is less steep than it is where these subjects follow electricity." A few of the problems of the first edition have been omitted, and new ones added.

THE first number of the *Journal of Agricultural Science*, edited by Messrs. T. H. Middleton, T. B. Wood, R. A. Biffen, and A. D. Hall, in consultation with other gentlemen, will be published in January next by the Cambridge University Press. The journal will publish only definitely scientific work in agricultural science, and will not include the results of the ordinary trials of manures and varieties for demonstration or commercial purposes. Papers for publication should be sent to Mr. T. B. Wood, University Department of Agriculture, Cambridge.

THE seventh edition of Dr. J. Frick's "Physikalische Technik," enlarged and completely revised by Prof. O. Lehmann, is in course of publication by Messrs. F. Vieweg and Son, Brunswick. The first half of vol. i. has been received, and the second half is promised shortly. The second volume will be published in a year or two, and will complete the work. In the part before us there are 629 pages and 2003 illustrations of lecture and laboratory apparatus for demonstrations and experiments in various branches of mechanics and physics.

A CHEAP edition (1s. net) of Mr. G. F. Chambers's "Astronomy for General Readers" has just been published by Messrs. Whittaker and Co. The book contains 268 pages and 134 illustrations, most of which represent the pictorial efforts of bygone days. As instances of the worst of these figures, reference may be made to Figs. 29, 104, 105, 106, 109, and 112. Before issuing this cheap edition an attempt should have been made to bring the text and the illustrations in line with the present position of astronomy, instead of leaving them as they were in the original volume.

THE *Journal of Anatomy and Physiology* for October (xxxix., part i.) contains a number of valuable papers, but of purely anatomical interest. The principal contribution is by Dr. Huntington on the derivation and significance of certain supernumerary muscles of the pectoral region, illustrated with fourteen excellent coloured plates.

THE new illustrated catalogue of physical apparatus just issued by Messrs. F. E. Becker and Co. (Messrs. W. and J. George, Ltd.) is likely to prove indispensable in the physical laboratories of all our schools and colleges. It runs to 628 large pages, and is strongly bound in cloth. Full particulars are provided, not only respecting the apparatus required in elementary and advanced physical teaching, but also concerning that necessary to the physicist in his research work. All branches of physics are included, and the instruments throughout are explained by excellent illustrations and concise descriptions, and, what is of prime importance, the figure and its appropriate text are close together.

NO. 1827, VOL. 71]

OUR ASTRONOMICAL COLUMN.

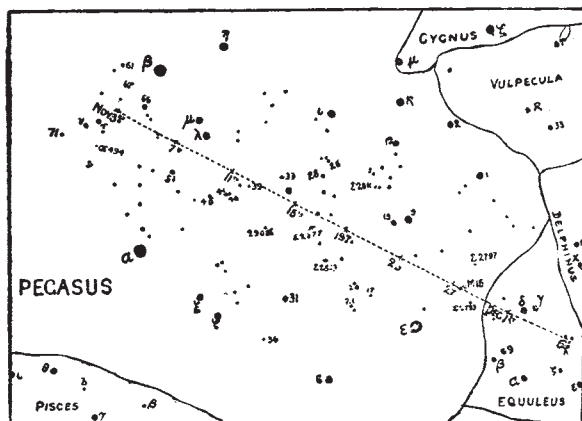
ASTRONOMICAL OCCURRENCES IN NOVEMBER:—

- Nov. 5. Saturn. Outer major axis of outer ring = $39''\cdot42$.
 " " Outer minor axis of outer ring = $11''\cdot01$.
 8. 11h. 50m. Minimum of Algol (β Persei).
 9. 13h. 0m. Venus in conjunction with Moon (Venus, $6^\circ 30' S.$).
 11. 8h. 39m. Minimum of Algol (β Persei).
 13. 21h. 0m. Juno in conjunction with Moon (Juno, $0^\circ 8' N.$).
 14. 0h. 0m. Saturn in conjunction with Moon (Saturn, $3^\circ 53' S.$).
 " 5h. 28m. Minimum of Algol (β Persei).
 " 16h. Epoch of November meteors (Leonids, radiant $150^\circ + 22^\circ$).
 15. Venus. Illuminated portion of disc = $0\cdot832$, of Mars = $0\cdot936$.
 16. 15h. Venus and Uranus in conjunction (Venus, $1^\circ 28' S.$).
 17. 5h. 5m. Transit of Jupiter's Sat. III. (Ganymede), egress.
 19. 11h. Jupiter in conjunction with Moon (Jupiter, $1^\circ 31' N.$).
 20. 10h. 24m. to 11h. 44m. Moon occults ξ Ceti (mag. 4.5).
 23. 5h. 20m. Near approach of Moon to α Tauri (mag. 1.1).
 24. 6h. 39m. to 8h. 34m. Transit of Jupiter's Sat. III. (Ganymede).
 25. Vesta in opposition to Sun (Vesta, mag. 6.5).

ENCKE'S COMET 1904 b.—In No. 3973 of the *Astronomische Nachrichten* M. M. Kaminsky gives a further ephemeris for Encke's comet, which he has corrected in accordance with the observation made at Heidelberg on September 11. The ephemeris gives the daily positions of the comet from October 14 to December 5, and the following is an abstract therefrom:—

Ephemeris oh. (M.T. Berlin).											
1904		α app.			δ app.			log. r		log. Δ	
		h.	m.	s.							
Nov.	3	...	23	10 34	...	+24	9	...	0.1510	...	9.7380
"	5	...	23	1 3	...	+23	21	...	0.1424	...	9.7305
"	7	...	22	51 37	...	+22	29	...	0.1335	...	9.7237
"	9	...	22	42 19	...	+21	33	...	0.1243	...	9.7178
"	11	...	22	33 11	...	+20	36	...	0.1147	...	9.7125
"	13	...	22	24 17	...	+19	35	...	0.1048	...	9.7080
"	15	...	22	15 34	...	+18	33	...	0.0946	...	9.7040
"	17	...	22	7 5	...	+17	29	...	0.0840	...	9.7008
"	19	...	21	58 49	...	+16	24	...	0.0730	...	9.6978

The accompanying chart shows, approximately, the apparent path of the comet through the constellation Pegasus into Equuleus from now until December 5.



SIMULTANEOUS OCCURRENCE OF SOLAR AND MAGNETIC DISTURBANCES.—Writing in No. 3, vol. xx., of the *Astrophysical Journal*, Herr A. Nippoldt, of the Potsdam Magnetic Observatory, disagrees with Father Cortie's conclusion (published in *Astrophysical Journal*, pp. 287–293, vol. xviii., 1903) re-